Abundance and distribution of spinner dolphins around the Hawaiian islands

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Background

This summer, I interned with the Marine Mammal Research Program through the University of Hawaii. I worked closely with Claire Lacey, who is currently studying the abundance and distribution of spinner dolphins, *Stenella longirostris*, around the Hawaiian islands. The entire Oahu coastline has already been completed, and the team is now focused on work off the Kona coast of Hawaii Island. I had two main roles throughout my internship. Firstly, I was part of the field team, going out on the boat daily to collect dolphin data. A major part of data collection was photographing dorsal fins for photo identification. My second major task was grading the photos in order to determine whether they were usable.

Bigger Picture

In order to manage stocks and aid in conservation, it is important to have abundance estimates. Abundance estimates are essential to determining the effects that removals will have on the population (Wade, 1998). Hawaiian spinner dolphin populations are genetically distinct from other spinner dolphin populations in the Pacific ocean (Andrews et al. 2010). Currently, the most recent spinner dolphin population estimate for Hawaii Island is from 2016 (Tyne et al., 2016). This current study is working to collect data through both line transect surveys and photo identification to produce an up-to-date assessment of the distribution and abundance of spinner dolphins around Hawaii Island.

Figure 1: Boat used for the Hawaii Island surveys. Photo by Ashley Marxsen

Figure 2: Taking photos of spinner dolphin dorsal fins from the boat. Photo by Phil Patton.

Methodology

Fieldwork:

- Transect lines inshore and offshore (2 km and 4 km in length respectively)
- Port observer, starboard observer, or data collector (rotating every 30 min)
- The port observer would look from 270 degrees to 10 degrees, while the starboard observer would look from 350 degrees to 90 degrees
- When something was seen, the distance and direction of the initial sighting were recorded before getting closer
  - This allows for the sighting to be matched with the GPS location, resulting in an accurate location of the sighting to be determined
- The data recorder would record this information and estimate number of individuals present
- Once closer to the animals, photographs of their dorsal fins would be taken from the boat
- After the photo-taking period was complete, the data recorder would record the percentage of individuals photographed, an updated estimate of the number of individuals, and other useful information

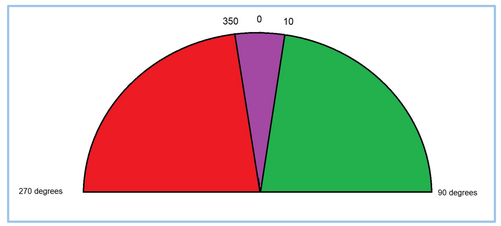

Figure 3: Diagram showing observation areas for port observer (red and purple) and starboard observer (purple and green).

Figure 4: Examples of individuals that would be considered less distinct (left) and more distinct (right). The photo on the right shows how AI algorithms trace the fin to match individuals. Photo by Isabel Levin (left) taken under NOAA research permit number 21476 and flukebook.org (right).

Methodology cont.

Photo-grading:

- Photos graded on clarity, contrast, angle, and visibility
- Given an overall quality score to determine grade: poor, good, excellent
- For good and excellent photos, the individual was scored by distinctiveness (dorsal fin markings)
- Good and excellent quality photos of individuals with distinctive fins will late be added to an online catalog, which uses AI algorithms to match photographs to individuals

Data Summary

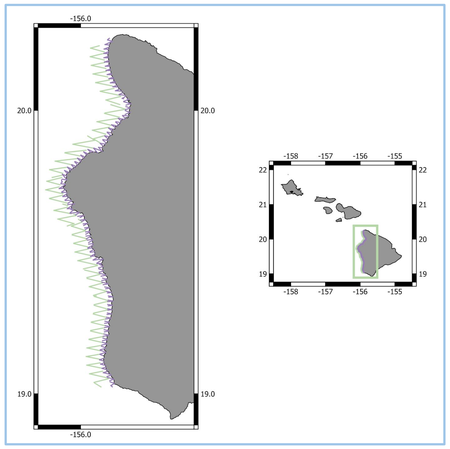

Figure 5: Example survey tracklines (offshore shown in green and inshore shown in purple). Map by Claire Lacey.

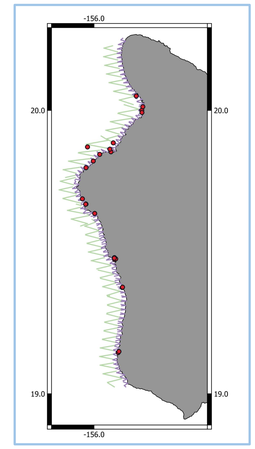

Figure 6: Example survey tracklines showing spinner dolphin sightings in red. Map by Claire Lacey.

- We completed 21 Hawaii Island survey days
  - 196 hours of moving time
  - 3940 km covered
- Total sightings (some off effort)
  - 1x sperm whale (1 individual)
  - 1x rough toothed dolphin (3 individuals)
  - 1x dwarf sperm whale (2 individuals)
  - 23x spinner dolphins (some groups included a few spotted dolphins)
  - 13x bottlenose groups
  - 10x short finned pilot whale groups

Conclusion

This data collection period was the first of two to take place off the Kona coast of Hawaii Island. As mentioned previously, the entire Oahu coast has also been surveyed. Results will come following the completion of data collection.

Acknowledgements

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Andrews, K.R. *et al.* (2010) 'Rolling stones and stable homes: social structure, habitat diversity and population genetics of the Hawaiian spinner dolphin (*Stenella longirostris*): GENETIC STRUCTURE OF HAWAIIAN SPINNER DOLPHIN', *Molecular Ecology*, 19(4), pp. 732–748. Available at: https://doi.org/10.1111/j.1365-294X.2010.04521.x.

Tyne, J.A. *et al.* (2016) 'Evaluating monitoring methods for cetaceans', *Biological Conservation*, 201, pp. 252–260. Available at: https://doi.org/10.1016/j.biocon.2016.07.024.

Wade, P.R. (1998) 'Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds', *Marine Mammal Science*, 14(1), pp. 1–37. Available at: https://doi.org/10.1111/j.1748-7692.1998.tb00688.x